

Graphical User Interface for High Energy Multi-Particle Transport, Phase II

Completed Technology Project (2006 - 2008)



Project Introduction

Computer codes such as MCNPX now have the capability to transport most high energy particle types (34 particle types now supported in MCNPX) with energies extending into the teravolt energy range. The efficient use of these types of Monte Carlo tools is very important for modeling the effects of space radiation on humans, spacecraft and equipment. This proposal would develop a graphical user interface for high energy multi-particle transport. With this innovation, users of the MCNPX code would have access to a powerful graphical user interface for efficient creation and interrogation of their input files, which would significantly reduce the amount of time required to create and debug input files. Specific enhancements that are proposed include the implementation of the Los Alamos Quark-Gluon String Model Module in MCNPX; adding the source creation capability to the graphical user interface; improvements to data visualization and 3D geometry plotting; and the investigation of implementing spline surfaces in MCNPX.

Anticipated Benefits

Potential NASA Commercial Applications: Any physics applications that utilize the transport of high-energy particles will benefit from this work. These applications include: 1. Investigations for accelerator isotope production and destruction programs, including the transmutation of nuclear waste. 2. Design of accelerator spallation targets, particularly for neutron scattering facilities. 3. Research into accelerator-driven energy sources. 4. Medical physics, especially proton and neutron therapy. 5. Accelerator-based imaging technology such as neutron and proton radiography. 6. Design of shielding in accelerator facilities. 7. Activation of accelerator components and surrounding groundwater and air. 8. High-energy dosimetry and neutron detection. 9. Design of neutrino experiments. 10. Charged-particle tracking in plasmas.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

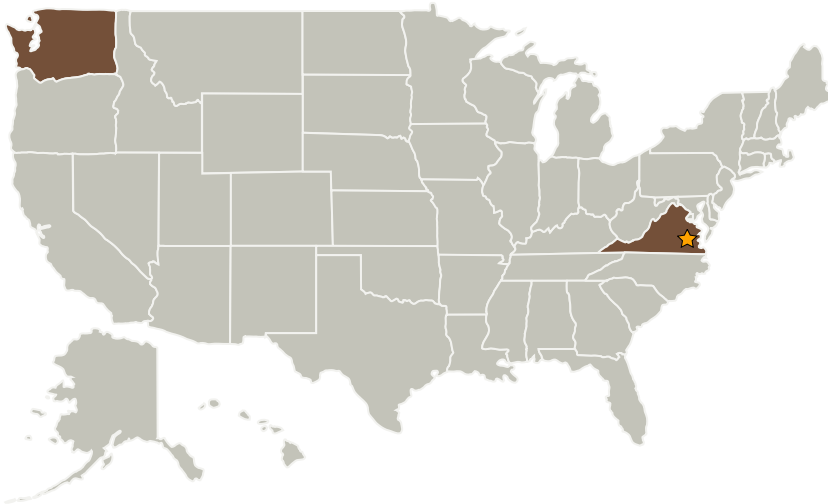
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Visual Editor Consultants	Supporting Organization	Industry	Richland, Washington

Primary U.S. Work Locations

Virginia	Washington
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Project Transitions

December 2006: Project Start

November 2008: Closed out

Closeout Summary: Graphical User Interface for High Energy Multi-Particle Transport, Phase II Project Image

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Randolph Schwarz

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines